Sustaining Pressure Ulcer Best Practices in a High-Volume Cardiac Care Environment

How one hospital reduced the incidence of hospital-acquired pressure ulcers to zero.

OVERVIEW: Narayana Hrudayalaya Cardiac Hospital (NHCH) in Bangalore, India (now known as the Narayana Institute of Cardiac Sciences), is one of the world's largest and busiest cardiac hospitals. In early 2009, NHCH experienced a sharp increase in the number of surgical procedures performed and a corresponding rise in hospital-acquired pressure ulcers. The hospital sought to reduce pressure ulcer prevalence by implementing a portfolio of quality improvement strategies. Baseline data showed that, over the five-month observation period, an average of 6% of all adult and pediatric surgical patients experienced a pressure ulcer while recovering in the NHCH intensive therapy unit (ITU). Phase 1 implementation efforts, which began in January 2010, focused on four areas: raising awareness, increasing education, improving documentation and communication, and implementing various preventive practices. Phase 2 implementation efforts, which began the following month, focused on changing operating room practices. The primary outcome measure was the weekly percentage of ITU patients with pressure ulcers. By July 2010, that percentage was reduced to zero; as of April 1, 2014, the hospital has maintained this result. Elements that contributed significantly to the program's success and sustainability include strong leadership, nurse and physician involvement, an emphasis on personal responsibility, improved documentation and communication, ongoing training and support, and a portfolio of low-tech changes to core workflows and behaviors. Many of these elements are applicable to U.S. acute care environments.

Keywords: evidence-based practice, hospital-acquired pressure ulcer, pressure ulcer prevention, quality improvement, skin care champion, surgical pressure ulcer

Hospital-acquired pressure ulcers exact a high toll from patients, providers, and health care facilities. Such ulcers subject patients to emotional and physical pain and suffering, delay recovery and hospital discharge, predispose patients to other complications, and in extreme cases can be fatal.[1,2] Moreover, because maintaining skin integrity is recognized as essential to patient health, the development of a hospital-acquired pressure ulcer is often viewed as evidence of failure on the part of providers. Indeed, the rate of hospital-acquired pressure ulcers is widely used as an indicator of nursing care quality.[3] From an economic standpoint, pressure ulcers have been demonstrated to be a significant,

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The Skin Lesion Monitoring form accompanies a surgical patient from arrival on the ward through postoperative return to the ward. Photo courtesy of NHCH.

independent predictor of both hospital costs and length of stay.[4]

The belief that hospital-acquired pressure ulcers are preventable has led to the development of several evidence-based practices designed to reduce or eliminate their occurrence. Many of these practices have been tested in clinical settings and documented in the literature. Yet for numerous reasons, implementing them at the bedside remains challenging, especially in acute care settings.[5,6]

In 2009, a large cardiac care hospital in India decided to implement quality improvement strategies designed to reduce the incidence of hospital-acquired pressure ulcers. Following implementation, such incidence was reduced to zero in a high-risk, high-volume surgical environment. As of April 1, 2014, the hospital has continued to maintain this result. In this article, with the benefit of hindsight and the assistance of researchers from Stanford University, we describe the quality improvement program, focusing particularly on identifying those factors that may have contributed to its success and sustainability, so that other hospitals may benefit from this experience.

BACKGROUND

In acute care facilities, surgical patients have a higher risk of developing pressure ulcers than nonsurgical patients because of factors intrinsic to the operating room (OR) environment.[7] Under anesthesia, patients experience circulatory and metabolic changes that may increase the risk of tissue compromise. They cannot perceive and respond to the pain of unrelieved pressure, or be turned. Patients undergoing cardiac surgery are among the most vulnerable of surgical populations.[8] Risk factors specific to cardiac surgery include longer times spent on the OR table[7,9]; the demands of body temperature and circulation regulation[9]; and the use of cardiac-assistive devices, such as

the intraaortic balloon pump and extracorporeal membrane oxygenation, that interfere with postoperative repositioning.[8,9] Although incidence estimates vary considerably, a systematic review of studies of pressure ulcer incidence in surgical patients published between 2005 and 2011 found a pooled incidence of 18% in patients who underwent cardiac surgery, compared with an overall pooled incidence of 15%.[10]

ONE HOSPITAL'S QUALITY IMPROVEMENT PROGRAM

Narayana Hrudayalaya Cardiac Hospital (NHCH) in Bangalore, India (now known as the Narayana Institute of Cardiac Sciences), is a 1,000-bed facility that is considered the world's largest and most productive cardiac hospital.[11] The facility has 24 surgery suites and in 2013, performed from 18 to 24 adult procedures and 11 to 15 pediatric procedures per day. NHCH surgeons operate six days per week, and perform up to four procedures per day.

Recognizing the problem. In early 2009, NHCH experienced a sharp increase in the number of cardiac procedures it performed, along with an upward trend in hospital-acquired pressure ulcers. This trend troubled cardiac surgeon Devi Prasad Shetty, who is also the hospital's founder, chairman, and managing director (hereafter we refer to him simply as the managing director). "Patients don't come to the hospital with pressure ulcers," he told us. "It is something we give them." In August 2009, the managing director initiated a program to reduce pressure ulcer incidence at NHCH, tasking the nursing superintendent (one of us, RP) with designing and implementing effective preventive strategies. Initially the investigative team consisted of the nursing superintendent, four skin care nurses, one nurse manager, and one ward-nurse-in-charge. (Eventually, all of the hospital's 809 nurses became involved in the pressure ulcer prevention program, as did all surgeons, anesthetists, and intensivists.)

Many surgeons seemed to subscribe to the idea that if they healed the heart, the skin would 'take care of itself.'

Reviewing the literature. Led by the nursing superintendent, the investigative team launched its initiative by reviewing the literature on the causes of and risk factors associated with surgical pressure ulcer formation. These included extrinsic factors, such as moisture and reduced tissue perfusion, and intrinsic factors associated with an individual patient, such as advanced age and comorbidities.[12] At NHCH, most patients who are admitted for cardiac surgery are in relatively robust physical condition (a profile also noted in the literature[9]). Although this physical stability should reduce the risk of ulcer formation, there is evidence that a patient's health status at the time of surgery is less important in this regard than the intraoperative environment.[7]

The investigative team also reviewed established best practices for preventing pressure ulcers as documented by other acute care facilities. These practices include the use of risk assessment tools such as the Braden Scale for Predicting Pressure Sore Risk (often simply called the Braden Scale),[13] as well as frequent visual inspection and documentation of skin condition. They also include strategies to reduce shear, friction, and moisture and relieve pressure, such as frequent repositioning and the use of pressure-redistributing surfaces. Enhanced staff education is considered essential to integrating such strategies into clinical practice.[14]

Initial observations. With these guidelines in mind, the team observed routine patient care procedures and documented all pressure ulcer occurrences from August through December 2009. This investigation revealed that many staff members had lost their focus on pressure ulcer prevention and that several practices and attitudes were undermining patient skin care.

First, at the organizational level, responsibility for skin care was not clearly assigned. While a physician's assistant was charged with tracking NHCH's overall pressure ulcer incidence, there was no single person or department tasked with consistently monitoring hospital-wide procedures and directing improvements. Nurses were considered responsible when pressure ulcers developed, yet had little influence over the course of events that might cause ulcer formation. For example, a surgeon might give orders not to move a patient after surgery, even if that patient had already been motionless on the OR bed for a prolonged length of time. The nurses were required to follow those orders, even though they knew that failing to reposition the patient to relieve pressure could compromise skin integrity. A related problem was the lack of physician involvement. Many surgeons seemed to subscribe to the idea that if they healed the heart, the skin would "take care of itself"—thus leaving skin care entirely to the nurses.

At the procedural level, the team identified several problems, including inadequate risk assessment, insufficient review and documentation of skin condition, and inconsistent adherence to pressure-relieving practices. The team also recognized that the staff needed further education to promote a better understanding of the etiology of pressure ulcers and their associated costs. Specific training was needed to counter a common perception among nurses that

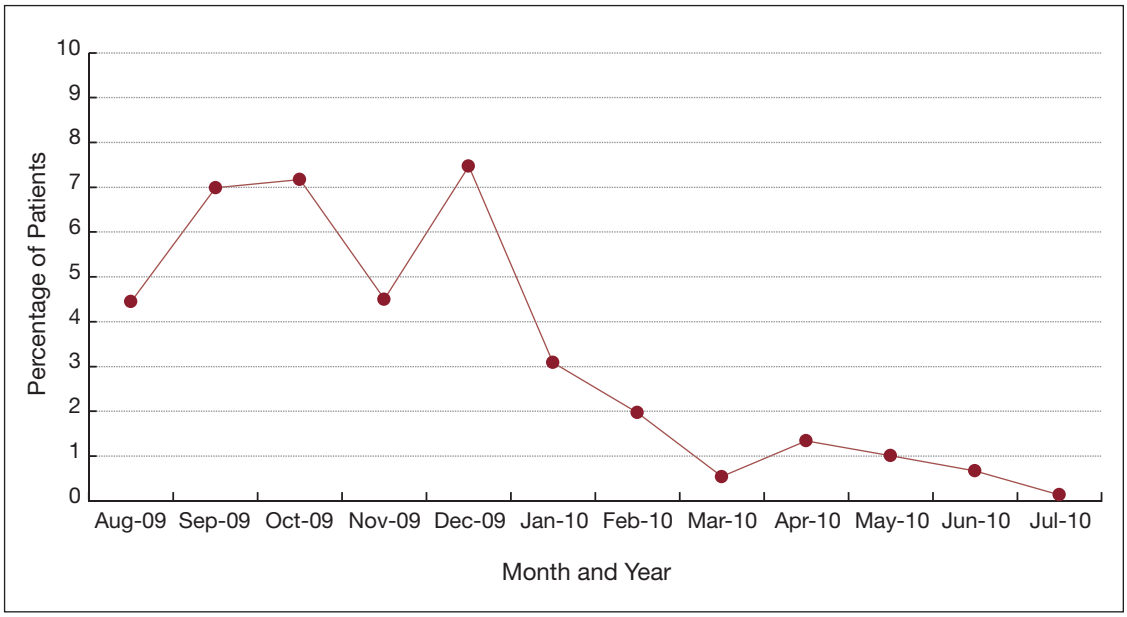

Figure 1. Average Monthly Percentage of ITU Patients with Pressure Ulcers, August 2009–July 2010. The percentage of patients with pressure ulcers was reduced to zero and has remained at zero as of April 1, 2014. ITU = intensive therapy unit.

hospital-acquired pressure ulcers "just suddenly appeared." Because intraoperatively acquired pressure ulcers generally progress from the muscle and subcutaneous tissue outward, they may not present immediately. Tissue damage can appear hours or even days after a procedure, and the first indicators can be as subtle as a slight discoloration or a change in skin texture or temperature.[15] Training nurses to recognize these early signs was necessary in order to demystify their appearance and facilitate earlier intervention.

Establishing an approach and gathering baseline data. To calculate the weekly percentage of patients with pressure ulcers, every week a team of four designated nurses reviewed all skin care documentation for patients in the adult and pediatric intensive therapy units (ITUs) to determine how many had a pressure ulcer in any stage; this number was then divided by the total number of patients in the ITUs that week. (At NHCH, a surgical patient moves through the following units: admission, ward, OR, ITU, ward, discharge. Separate pediatric and adult ITUs and wards are maintained.) The hospital's internal quality control group audited the weekly results each month, and the audited calculations were averaged to provide monthly percentages (see Figure 1). Surgical patients are most at risk for hospital-acquired pressure ulcers if tissue damage occurs during the intraoperative and immediate postoperative periods, before they regain mobility. Thus the ITUs were deemed the most appropriate location for recording and measuring pressure ulcer occurrences.

Because some patients with ulcers remained in the ITU longer than one week and thus were counted more than once, we did not measure ulcer incidence (the preferred measure for a reduction effort). But the weekly percentage of patients with ulcers as calculated was sufficient to serve as a baseline. During the five-month observation period, we established that an average of 6% of all adult and pediatric patients experienced a pressure ulcer while in the ITUs.

IMPLEMENTATION: PHASE 1

Having established a baseline and selected a portfolio of quality improvement strategies to address the observed shortfalls, the team's next step was to integrate these new strategies into daily patient care. Phase 1 efforts, which began in January 2010, focused on four main areas: raising awareness, increasing education, improving documentation, and implementing preventive practices.

Awareness. Recognizing that pressure ulcer prevention requires a multidisciplinary effort, the team sought first to raise awareness throughout the facility that hospital-acquired pressure ulcers are both undesirable and preventable. To do that, the nursing superintendent established a protocol mandating that any sign of a pressure ulcer was to be reported to her

immediately and directly. Upon being so notified, she went to the patient's bedside to inspect the skin and confirm the observation of the staff nurse. Because of its importance, this verification was always performed by the nursing superintendent. Then, simultaneously with beginning treatment, the superintendent and the nurses on the skin-monitoring team photographed the ulcer and prepared a detailed incident report, which included

- the patient's age.
- the diagnosis.
- the date of admission (to determine the number of days in the hospital).
- the unit in which the pressure ulcer was first observed.
- information about the suspected root cause, including the time since the last risk assessment and position change.
- any care orders that may have precluded a position change.

This report was also used to document follow-up actions, in terms of both individual patient care and any facility-wide response (such as a procedural change). Once complete, the incident report was signed by the attending physician, the staff nurse, and the shift-nurse-in-charge, and collected by the nursing superintendent. (At NHCH, the nursing chain of command is as follows: nursing superintendent, deputy nursing superintendent, nurse manager, ward-nurse-in-charge, shift-nurse-in-charge, staff nurse.)

pressure ulcer cases. Having the nurses involved with each incident present at the meeting served similar purposes: to increase transparency and to underscore the importance of adhering rigorously to preventive protocols in order to avoid being held accountable for an unfavorable outcome. The weekly discussions not only raised awareness; by reinforcing the concept of personal responsibility, they also helped make pressure ulcer prevention a hospital imperative. It's important to note that the tone of these discussions was constructive, with a focus on process improvement, rather than punitive.

NHCH's internal quality control team also presented the monthly pressure ulcer statistics to the administration steering committee each month. These reports helped ensure continued administrative awareness and ongoing involvement.

Education. The managing director's mandate to reduce hospital-acquired pressure ulcers meant that relevant staff education became a priority. The nursing superintendent designed a special class aimed at improving nurses' understanding of pressure ulcer development and prevention. The curriculum revisited the etiology of pressure ulcers; introduced the Braden Scale as a risk assessment tool; and reviewed preventive strategies, including comprehensive visual skin assessment, repositioning for nonmobile patients, moisture management, skin cleansing and care, and nutrition and hydration. Special attention was paid to the early identification of surgical pressure ulcers. The

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These pressure ulcer incident reports and photographs were introduced into the hospital's weekly mortality meetings, which are attended by all department heads, the hospital's surgical and physician coordinators, and the managing director. The nursing superintendent, accompanied by the nurse manager and the shift-nurse-in-charge under whose care the patient had been at the time of pressure ulcer development, presented each incident report. Each case was discussed in detail, with particular focus on the number of hours the patient had spent on the operating table and any other risk factors that might have contributed to the ulcer's development. Because each patient's report identified a specific OR—and by implication, a particular anesthesiologist and surgeon—the physicians were made aware of one another's

photographs from the incident reports were used to help nurses learn to recognize the earliest signs of skin damage, as well as how to differentiate pressure ulcers from other types of skin ulcerations. Lessons from this class were reinforced during the nurses' monthly process improvement meetings.

Because pressure ulcer prevention is nursing intensive, high nursing staff turnover can adversely affect such efforts. NHCH's high-volume environment attracts many new nurses who come for training and experience before moving on to positions elsewhere. On average, every month about 6% of the hospital's nursing staff departs and must be replaced. To ensure continuity of care and adherence to the pressure ulcer prevention program, the six-day induction program for new nurses was modified so that four of the

48 hours were dedicated to pressure ulcer education. Areas covered included the stages of pressure ulcer development, identification of early signs of ulcer formation, training in the use of the Braden Scale, and the hospital's skin care observation and documentation process (described in the next section). By mentoring new nurses and taking advanced training courses, experienced nurses also became more focused on preventing hospital-acquired pressure ulcers. Additional expertise was made available to nursing staff when four senior nurses were promoted to skin care specialists. Rosters and schedules were adjusted to ensure that on each shift, one skin care specialist was on duty to help assess skin condition, verify pressure ulcer identification, and direct interventions. The fourth specialist served as backup when needed.

Documentation. *Initial skin assessment.* Recognizing that consistent use of clear, accessible documentation is essential to ensuring adherence to best practice protocols, the investigative team overhauled existing documents and created new ones. First, the admission protocol was changed to include comprehensive skin assessment and a Braden Scale risk assessment score at intake, and the Nursing Assessment on Admission forms for both pediatric and adult patients were modified to allow documentation of these new procedures. (Under the old admission protocol, patient skin integrity wasn't assessed until the patient was moved after surgery from the OR to the ITU. This delay might have contributed to the aforementioned perception that pressure ulcers appeared suddenly and abruptly.)

Ongoing skin assessments. Most pressure ulcer clinical guidelines suggest that nurses do a risk assessment on admission, at discharge, and "whenever the patient's clinical condition changes."[16] But at NHCH, the premise was that because surgical patients are at elevated risk for developing a pressure ulcer,[15, 17, 18] they must be monitored frequently and repeatedly between periodic formal risk assessments. Accordingly, the team modified its processes as follows. At minimum, a patient's skin is visually checked on admission, before the patient is moved to the OR, on transition from the OR to the ITU, every two hours while in the ITU (in concert with repositioning), and at every shift change once back in the ward. Braden Scale scoring is required at key transitions (on admission, preoperatively, and postoperatively). Skin checks may be performed even more frequently in accordance with the patient's physical status at any given time.

The team's main focus was on standardizing regular visual skin checks and documentation of skin integrity for all patients throughout hospitalization. We also sought to improve individual staff member accountability. To these ends, sections for reporting skin status were added to multiple nursing care checklists, and new protocols and forms were created. One such form, the Skin Lesion Monitoring form, accompanies a surgical patient from arrival on the ward through postoperative return to the ward. This form specifies preventive perioperative practices (discussed further below), and calls for checks of high-risk skin areas at each transition point, with both the physician and nurses signing off on the results. It also notes whether the patient may be repositioned after surgery. If the surgeon does not want the patient moved, the surgeon must sign to indicate that she or he accepts responsibility for choosing a care protocol not in accordance with pressure ulcer preventive practices.

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The new protocol for skin checks and transfer of responsibility at each care juncture involves at least three nurses. Just before a transition, the staff nurse receiving the patient assesses each skin area under the observation of both the receiving shift-nurse-in-charge and the staff nurse handing off the patient. If the patient's skin condition is deemed acceptable, the receiving staff nurse and the physician sign the form and accept responsibility for the patient. On the first postoperative day, when patients are intubated, it may require a few extra minutes to turn the patient and visually assess skin surfaces and folds; but as patients regain mobility, skin checks take less time. These repeated checks and signatures during the course of hospitalization create a virtual "chain of custody" for a patient's skin care and establish staff members' personal accountability. It's also important to note that these assessments incorporate performance monitoring and feedback. The more senior nurses-in-charge watch the staff nurses perform skin checks; if necessary, the senior nurse will either step in to assist or will redo the skin check with the staff nurse observing. Performance monitoring and feedback are considered core quality improvement strategies and are used together to reinforce awareness and adherence to interventions.[19]

If a patient's skin is found not to be intact, different events transpire. Typically the skin care specialist nurse is called, the problem is documented on an incident report, and appropriate treatment begins. The receiving staff nurse signs the form accepting the

patient, but notes that this problem existed when she or he received the patient. This allows us to quickly pinpoint on whose watch and on which unit a pressure ulcer first developed.

By the time patients are moved from the ITU back to the ward, most are mobile again, which significantly reduces the risk of pressure ulcer formation. At this point the Skin Lesion Monitoring form is replaced with a Daily Monitoring of Skin Lesions form, which calls for skin checks at each shift change. (At NHCH, the day and evening shifts each last seven hours, while the night shift lasts 10 hours.) But the same chain-of-custody practices continue. At the end of each shift, the incoming staff nurse checks the skin of each patient to be in her or his care, with both the incoming shift-nurse-in-charge and the departing staff nurse observing. The incoming staff nurse accepts responsibility for each patient only if the skin is intact; if it isn't, the incoming nurse signs the form accepting the patient, but notes that this problem was preexisting.

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Preventive measures. Initial preventive efforts were focused on ensuring strict adherence to patient-repositioning schedules. Patient repositioning begins during the immediate postoperative period. Before phase 1 of our project began, nurses were not allowed to reposition patients on cardiac-assistive devices. But after the nursing superintendent made it clear that the nursing staff would no longer accept responsibility for pressure ulcers that developed in patients on such devices, the surgeons, anesthesiologists, and intensivists collectively determined that it was safe and acceptable to reposition these patients by approximately 30°. This change allowed nurses to strategically place pillows and air cushions in order to relieve pressure and enhance air circulation.

Once a patient is in the ITU, the standard protocol calls for turning or repositioning patients every two hours.[20] The ITU uses an oversized, color-coded observation chart that makes key patient information, including vital signs, medications, and ongoing care measures, immediately accessible to all staff providing postoperative care. It includes a section for recording and initialing each repositioning and any observed skin conditions. Before phase 1 began, this section wasn't being filled out consistently; after phase 1 implementation, such documentation was rigorously enforced.

IMPLEMENTATION: PHASE 2

Changing OR practices. Within one month of implementing the new protocols, the average monthly percentage of patients with pressure ulcers had dropped to 3.09%. Encouraged but not satisfied, the team initiated phase 2 in February 2010, devoting special attention to monitoring and managing risk factors during surgery. One such challenge was moisture management. The team realized that the antiseptic solution used in the preoperative scrub often pooled underneath a patient's sacral area. To address this, we devised a means of absorption: placing linen rolls at either side of the patient, under the legs and forearms, and in the gluteal region, then removing them after the scrub. Although these measures reduced the amount of moisture on the patient's skin, they didn't eliminate it entirely. After further discussion, the OR nurses obtained consent from the surgeons and anesthesiologists to turn the anesthetized patient 30° and dry the scapular and gluteal regions with a pad; this was done immediately before surgery. At the end of surgery, the patient is cleaned and the back is again dried. These new moisture management practices were taught to all OR nurses and technicians and explained to the anesthesiologists.

The team also investigated other OR practices that compromised the skin. Since prolonged immobility is a risk factor, the team obtained permission to reposition parts of a patient's body slightly during lengthy surgical procedures. To reduce friction, the hospital replaced all standard bedding in the OR with wrinkle-resistant bedding[21] and added procedures to protect the patient's skin from folded wires and tubes. The adhesive the hospital had been using to anchor endotracheal tubes was also changed. The old adhesive was difficult to remove and could cause small skin necroses; by switching to a product that was easier to remove, the nurses eliminated the problem.

As these new best practices became routine, pressure ulcer prevention became a point of pride throughout the hospital. The average monthly percentage of ITU patients with a hospital-acquired pressure ulcer dropped from 3.09% in January 2010 to 0.54% in March, then bounced up slightly before declining to zero in July 2010. As of April 1, 2014, the hospital has maintained this result.

SUSTAINABILITY: SIX KEY ELEMENTS

Although the description of this quality improvement program might suggest that eliminating hospital-acquired pressure ulcers was easy, in fact the team's progress was uneven and the outcomes were hard earned. Finding the right interventions and then determining how to integrate them and make them stick was difficult, especially at first. The literature

on pressure ulcer prevention programs confirms that adherence to evidence-based prevention protocols is often variable,[5, 6] and that explicit strategies are necessary to sustain such programs over time.[22] In comparing the programs described in the literature with ours, we believe that six key elements distinguish NHCH's program and contribute significantly to its sustainability. These elements, and their potential applicability to acute care settings in the United States, are described below.

Leadership. The desire to reduce patients' pain and suffering clearly drives efforts to prevent hospital-acquired pressure ulcers. But the financial burden associated with treating such ulcers is also significant. A statistical brief from the Agency for Healthcare Research and Quality's Healthcare Cost and Utilization Project noted that the length of hospital stay more than doubled when an adult patient developed a pressure ulcer, and that the cost of hospital stays that included a pressure ulcer totaled $11 billion in 2006.[23] In 2008, the Centers for Medicare and Medicaid Services (CMS) announced that stage 3 and 4 hospital-acquired pressure ulcers were "never events"—preventable, adverse events that reflect errors in medical care—and that hospitals would not be reimbursed for the associated costs.[24] In combination, these human and financial costs are significant enough to warrant the attention of hospital leaders at all levels, from administration to the bedside.

At NHCH, the role of leadership was evident from the start, with the hospital's managing director making a personal commitment to the program and staying actively and visibly involved. The managing director's support was important in empowering the senior nursing staff to investigate existing practices and either improve them or create alternatives, as needed—even if this meant challenging the hierarchy. Admittedly, this managing director has earned a particularly high level of respect from staff members—a factor that may be difficult to replicate in other cultures or organizations, especially in less hierarchical U.S. institutions. Still, as Barron and colleagues have observed, for an improvement program to succeed, leaders must "provide a supportive environment, make resources available, remove barriers to change, and help create systems that hold people accountable."[25] This is especially true in pressure ulcer prevention programs where the needed prevention activities, such as risk assessment, skin assessment, and patient repositioning, are highly repetitive and often viewed as mundane.[26] Similarly, McElhinny and Hooper concluded that a nurse-led project to reduce heel ulcer rates was unsuccessful, in part, because the facility's management failed to convey their belief in and support for the project.[27]

Besides executive leadership, it's essential to have a focused nursing team, one willing to take on the challenges of translating an initiative to bedside practices and ensuring ongoing adherence to those practices. At NHCH, after announcing the initiative, the managing director effectively transferred his authority to the nursing superintendent, who then led a senior nursing team tasked with implementation. In the United States, such responsibilities are often handled by selected nurse leaders and designated skin care "champions."[28] These professionals can inspire nurses to implement and sustain best practices by providing education, measuring progress, promoting accountability, and serving as clinical role models. Selecting the right people to lead a quality improvement project is vital.[20, 28] Successful leaders take personal ownership of the project and are dedicated in their efforts to promote it. They are skilled communicators who can favorably influence others; and they're respected by their peers and backed by executive management. The involvement of strong nursing leadership has been shown to significantly improve pressure ulcer outcomes and to help maintain that success.[28-30]

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Physician involvement. Pressure ulcers have traditionally been identified as a nursing care issue.[8, 16] But at NHCH, physician involvement was central to creating an environment of shared responsibility for patient skin care and paving the way for needed changes. Only when the physicians recognized both the need to reduce pressure ulcer incidence and their role in doing so was the nursing team able to modify existing perioperative practices.

In the United States, physician involvement is equally critical. In a 2011 study of pressure ulcer prevention program implementation at four U.S. hospitals, Jankowski and Nadzam found that initially three of the four had failed to involve physicians in any way.[6] This resulted in the nurses' perception that the

physicians were uninterested in pressure ulcer prevention. Physician participation is especially important in acute care facilities, given that the OR environment imposes additional risk factors for ulcer development. In the United States, the requirements of third-party payers may help to increase physician involvement. For example, with the aforementioned shift in the CMS's reimbursement policy, admitting physicians are increasingly called upon to document existing pressure ulcers in order to preclude their classification as hospital-acquired events.[31]

help engage them, facilitate the tracking of results over time, and prompt recognition for improved outcomes. Indeed, this may seem intuitive. Yet a recent meta-analysis of 39 studies investigating quality improvement programs aimed at preventing pressure ulcers found that there was limited collection of performance data, and that performance monitoring and feedback to staff often weren't used together.[19]

Documentation and communication. Our team relied on a low-tech but systematic approach to documentation that allows patient-specific information to

As one senior nurse said, 'It was the personal responsibility that started making a difference. Now everybody's aware, everybody's cooperative and on their toes, and we have no skin ulcers.'

Personal responsibility was perhaps the most novel element contributing to our program's sustained success. The fact that every hospital-acquired pressure ulcer was reported immediately, documented, and then discussed at the weekly mortality meetings created absolute transparency and personal accountability—especially since the incident reports identified those caring for the patient at the time an ulcer developed. The forms created to document skin assessments and adherence to repositioning schedules reinforced accountability by requiring signatures at each care juncture.

Considering pressure ulcer prevention through the lens of personal responsibility was constructive. It helped the managing director and the nurse leaders to inspire the staff to strive for a "culture of safety," one that encouraged a personal sense of pride and accomplishment. Although individuals were singled out for any pressure ulcers that developed in patients under their care, the team was able to focus on learning and improvement, not censure. As one senior nurse said, "It was the personal responsibility that started making a difference. Now everybody's aware, everybody's cooperative and on their toes, and we have no skin ulcers."

Because every hospital has its own organizational culture, replicating such accountability elsewhere might be challenging. It's essential to establish mechanisms for engendering personal accountability that are effective and credible without being threatening. While several studies have noted the importance of accountability,[25,28] how best to foster it remains unclear. One possibility is to use mechanisms that establish personal responsibility by reinforcing positive changes. For example, providing immediate and ongoing feedback to staff about pressure ulcer occurrences can

be shared among departments. As described above, this system is built around paper documents that are completed and signed at each care juncture and that travel with the patient. A paper-based system was the natural choice at NHCH, because the facility has not yet adopted a hospital-wide electronic medical record (EMR) system. Most U.S. hospitals will have to choose whether to implement a system that exists outside or within the EMR. While EMRs can alert caregivers when a skin care assessment or position change has not been recorded, it remains unclear whether a patient's EMR is as easy to use and accessible to all staff as a paper document. In 2011, Delmore and colleagues documented the establishment of a pressure ulcer prevention program at a large medical center in New York City; they noted that the perioperative staff ultimately turned to a paper form for recording skin assessments and Braden Scale scores preoperatively, in the immediate postoperative period, and on admission to postanesthesia care.[32] The paper form was created because the EMR used by the perioperative staff didn't communicate with that used by the rest of the institution; nor did it provide for skin assessments at key care junctures. And in 2010, Young and colleagues detailed the implementation of a pressure ulcer prevention project in a large Midwestern hospital system.[33] They noted that when the project began, nurses had to navigate up to eight separate screens to document skin care electronically; this often resulted in incomplete documentation. However, once this problem was resolved, the authors reported that "[t]he electronic tool facilitated implementation of preventive care."

At NHCH, documentation was an integral part of the daily workflow. This facilitated pressure

ulcer–related communication across hospital staff, prompting appropriate actions and helping to ensure continuity of care. Such integration is also important to a program's success. In their 2011 study, Jankowski and Nadzam found that at none of the four hospitals were Braden Scale scores or prevention care plans routinely included in communications between providers, including shift-to-shift reports, reports from nurses to nursing assistants or physicians, or any other handoffs.[6] And there is evidence that integrating risk assessment and preventive strategy forms into the daily nursing workflow may be critical to achieving compliance with documentation completion.[5] In short, regardless of whether documentation is kept on paper or electronically, it should be well integrated into standard workflows, quick and easy to complete, and highly visible and immediately accessible to all caregivers.

Training and support for caregivers is critical to the success of any pressure ulcer prevention program. Physicians, nursing personnel, and other hospital caregivers need to clearly understand the need for and reasons underlying protocol changes. Education should address the etiology of hospital-acquired pressure ulcers, risk factors, prevention strategies, documentation, identification and staging, and wound management.[33] Training that is frequent and ongoing and that includes quality improvement evaluations of bedside practices is vital to program sustainability.[6] For example, at NHCH, skin assessments were observed by the shift-nurse-in-charge, with immediate feedback given if an assessment was inadequate.

Simplicity. The NHCH pressure ulcer prevention program was fundamentally simple. Rather than first investing in pressure-redistributing mattresses and other high-tech equipment, the team began by implementing a portfolio of basic, low-tech changes to daily workflows and behaviors. In combination, these changes were incredibly powerful; they were also affordable and scalable across the organization.

India's lower labor costs made it feasible for the hospital to modify processes that involve nurses. NHCH maintains a 1:1 nurse-to-patient ratio for patients who are in the immediate postoperative ITU or on a ventilator, a 1:2 ratio for stable patients in the step-down ITU, and a 1:5 ratio for patients in the pre- and postoperative wards. As noted above, at least three nurses were present at each skin assessment; and the protocol calling for ITU patients to be repositioned every two hours is practical. In the United States, these practices may be prohibitively expensive or impractical, especially during nursing shortages. But creative strategies can be employed to achieve the same ends. For example, facilities could use unlicensed nursing staff at skin checks and to assist with repositioning; indeed, a special "mobility" team might be developed. Some facilities have experimented with outsourcing certain tasks. In Jankowski and Nadzam's study of pressure ulcer prevention program implementation at four U.S. hospitals, the hospital that had contracted with an outside company for patient repositioning demonstrated the highest adherence to turning schedules.[6]

Despite the cost, some facilities may want to consider the use of pressure-redistributing equipment. A 2006 systematic review of 59 clinical trials found evidence that the use of support surfaces and overlays can relieve the pressure of the patient's body weight on the skin.[34] But it's unclear whether the use of such equipment is any more or less effective than basic low-tech preventive strategies. Moreover, the use of pressure-redistributing equipment does not eliminate the need for patient repositioning.[16] And technology-based strategies may require more accurate risk assessment in order to make the best use of such resources. This remains particularly challenging for certain populations such as surgical patients. As Connor and colleagues have noted, although the Braden Scale is a useful risk assessment tool for the general population, "There is no single instrument that has been predictive of pressure ulcers that occur intraoperatively."[35] We believe that the success of our program at NHCH underscores the effectiveness of simple workflow changes.

Training that includes quality improvement evaluations of bedside practices is vital to the sustainability of any pressure ulcer prevention program.

CONCLUSION

Implementing an evidence-based pressure ulcer prevention program can reduce the occurrence of hospital-acquired pressure ulcers. But to sustain such improvement, acute care facilities must implement preventive practices efficiently and consistently. The success of our efforts indicates that it's possible to change a hospital's culture such that pressure ulcer prevention becomes a lasting priority. Elements that contributed to that success included strong leadership, dedicated nurse and physician involvement, an attitude of personal responsibility, improved documentation and communication, ongoing education, and a portfolio of low-tech changes to practice. These elements can be engendered and used anywhere. ▼

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